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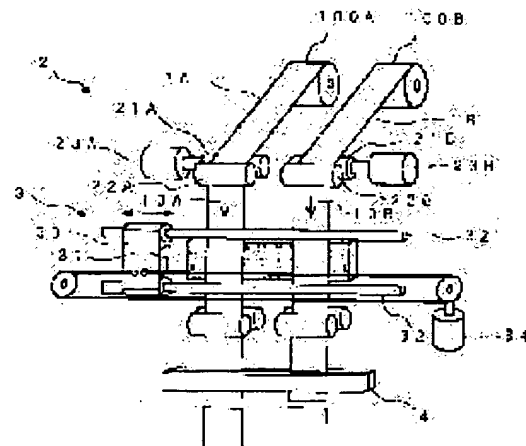
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## (54) INK JET RECORDING APPARATUS

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an ink jet recording apparatus capable of realizing a system of recording a plurality of rows which raises an effective main scanning rate and contributes to improving a throughput.

**SOLUTION:** This ink jet recording apparatus for recording images onto recording media 1A and 1B by jetting ink has a plurality of transfer paths 10A and 10B for transferring the recording media of a plurality of rows respectively, transfer means 2 set correspondingly over the transfer paths 10A and 10B of the plurality of rows for transferring the recording media of the plurality of rows, recording means 3 for executing recording by scanning over the recording media of the plurality of rows in a direction nearly orthogonal to a transfer direction of the recording media of the plurality of rows and jetting ink, a storage means for storing image data, and a recording control means for making the recording means start recording by scanning over the recording media of the plurality of rows after the image data corresponding to images of a plurality of rows are stored in the storage means.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] In the ink jet recording device which injects ink and records an image on a record medium Two or more conveyance ways for conveying the record medium of two or more trains respectively, and a conveyance means for it to be prepared corresponding to the conveyance on the street of said two or more trains, and to convey the record medium of two or more trains, The record means which records by scanning covering the conveyance direction and the abbreviation direct direction of a record medium of said two or more trains to the record medium of said two or more trains, and injecting ink, The ink jet recording device which has a storage means to memorize image data, and the record control means which makes said record means start record by the scan over the record medium of said two or more trains after the image data corresponding to two or more trains image is memorized by said storage means.

[Claim 2] The image data corresponding to two or more trains image memorized by the storage means at the time of said recording start is an ink jet recording device of the image data corresponding to the image of each train according to claim 1 which all comes out and is characterized by a certain thing.

[Claim 3] The image data corresponding to two or more trains image memorized by the storage means at the time of said recording start is an ink jet recording device according to claim 1 characterized by being a part of image data corresponding to the image of each train.

[Claim 4] The image data corresponding to two or more trains image memorized by said storage means is an ink jet recording device according to claim 1 characterized by being image data required for the at least 1 scan corresponding to the image of each train.

[Claim 5] The image data corresponding to the image of the train transmitted to the last among the image data corresponding to two or more trains image memorized by the storage means at the time of said recording start is an ink jet recording device according to claim 1 characterized by being this a part of image data.

[Claim 6] The image data corresponding to the image of the train transmitted to the last among the image data corresponding to two or more trains image memorized by the storage means at the time of said recording start is an ink jet recording device according to claim 1 characterized by being image data required for at least 1 scan.

[Claim 7] The image of the train transmitted before the image of the train transmitted at the end is an ink jet recording device according to claim 5 or 6 characterized by memorizing all corresponding image data.

[Claim 8] The conveyance way of two or more trains for being the ink jet recording device which injects ink and records an image on a record medium, and conveying the record medium of two or more trains respectively, A conveyance means for it to be prepared corresponding to the conveyance on the street of said two or more trains, and to convey the record medium of two or more trains, The record means which records by scanning covering the conveyance direction and the abbreviation rectangular cross direction of a record medium of said two or more trains to the record medium of said two or more trains, and injecting ink, In the condition of having a storage means to memorize the image data for two or more trains image, the train the image data corresponding to some or all of an image was remembered to be by said storage means, and the train image data is not substantially remembered to be The ink jet recording device which has the record control means which starts record by said record means.

[Claim 9] The image data of the train memorized by the storage means is an ink jet recording device according to claim 8 characterized by being the image data corresponding to all of images.

[Claim 10] The image data of the train memorized by the storage means is an ink jet recording device according to claim 8 characterized by memorizing any of the image data corresponding to all of images, and image data required for at least 1 scan they are.

[Claim 11] The image data of the train memorized by the storage means is an ink jet recording device according to claim 8 characterized by being image data required for at least 1 scan.

[Claim 12] Ink is injected based on the image data which received from the image processing system. The conveyance way of two or more trains for being the ink jet recording device which records an image on a record medium, and conveying the record medium of two or more trains respectively, A conveyance means for it to be prepared corresponding to the conveyance on the street of said two or more trains, and to convey the record medium of two or more trains, The record means which records by scanning covering the conveyance direction and the abbreviation rectangular cross direction of a record medium of said two or more trains to the record medium of said two or more trains, and injecting ink, It has a storage means to memorize the image data transmitted from said image processing system. From said image processing system, the image data corresponding to one image is divided into plurality. The sequential transfer even of the divided image data corresponding to the Nth (N is two or more integers) image is carried out following the divided image data corresponding to the 1st image. The ink jet recording device characterized by starting record by said record means after memorizing the image data corresponding to said Nth image for said storage means.

[Claim 13] The ink jet recording device according to claim 12 characterized by the division unit of said image data being M (M being one or more integers) Rhine unit.

[Claim 14] Ink is injected based on the image data which received from the image processing system. The conveyance way of two or more trains for being the ink jet recording device which records an image on a record medium, and conveying the record medium of two or more trains respectively, A conveyance means for it to be prepared corresponding to the conveyance on the street of said two or more trains, and to convey the record medium of two or more trains, The record means which records by scanning covering the conveyance direction and the abbreviation rectangular cross direction of a record medium of said two or more trains to the record medium of said two or more trains, and injecting ink, A receiving means to receive the image data transmitted from said image recording equipment, \*\*\*\* and the image data corresponding to one image is divided into plurality from said image processing system. The ink jet recording device which the sequential transfer even of the divided image data corresponding to the Nth (N is two or more integers) image is carried out following the divided image data corresponding to the 1st image, and is characterized by performing record by said record means according to reception with said receiving means.

[Claim 15] The ink jet recording device according to claim 12 or 14 characterized by being the unit which needs the division unit of said image data for record of each scan.

[Claim 16] The image processing system characterized by being the image processing system which transmits the image data for recording an image on the record medium of an ink jet recording apparatus, and for the image data corresponding to one image dividing into plurality, and carrying out the sequential transfer even of the divided image data corresponding to the Nth (N being two or more integers) image following the divided image data corresponding to the 1st image.

[Claim 17] The image processing system according to claim 16 characterized by the division unit of said image data being M (M being one or more integers) Rhine unit.

[Claim 18] The image processing system according to claim 16 characterized by being the unit which needs the division unit of said image data for record of each scan.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] About an ink jet recording device, in detail, this invention goes up the rate of effective horizontal scanning, and relates to the ink jet recording device which can realize two or more trains recording method which contributes to the improvement in a throughput.

[0002]

[Description of the Prior Art] Conventionally, the ink jet printer of a shuttle method was recorded with one sheet of form, or the roll sheet of one train. For this reason, when recording two or more images on coincidence, the image was put in order and recorded and it corresponded by the method of omitting behind. However, it is difficult to put in order and record two or more images and to cut into exact size. In case this point carries out continuation record of the image in the die-length direction, it becomes so difficult that the image size which should be cut is long.

[0003] Moreover, conventionally, when printing a frameless image, in order to print correctly to an edge, what is recorded on a form or a roll sheet cut into required size was performed beforehand, but the more it became the print of small size, the part of the acceleration-and-deceleration time amount of a recording head and the rate of effective horizontal scanning fell, and, the more there was a problem that a throughput declined.

[0004]

[Problem(s) to be Solved by the Invention] This invention was made in view of the situation conventionally [ above-mentioned ], and the technical problem of this invention goes up the rate of effective horizontal scanning, and is to offer the ink jet recording device which can realize two or more trains recording method which contributes to the improvement in a throughput.

[0005]

[Means for Solving the Problem] In the ink jet recording device which invention according to claim 1 injects ink, and records an image on a record medium Two or more conveyance ways for conveying the record medium of two or more trains respectively, and a conveyance means for it to be prepared corresponding to the conveyance on the street of said two or more trains, and to convey the record medium of two or more trains, The record means which records by scanning covering the conveyance direction and the abbreviation direct direction of a record medium of said two or more trains to the record medium of said two or more trains, and injecting ink, It is the ink jet recording device which has a storage means to memorize image data, and the record control means which makes said record means start record by the scan over the record medium of said two or more trains after the image data corresponding to two or more trains image is memorized by said storage means.

[0006] According to this invention, since record is possible in two or more trains, compared with a conventional single row-type ink jet recording device, improvement in a throughput is possible.

[0007] It is the ink jet recording device of the image data corresponding to the image of each train in the image data corresponding to two or more trains image with which invention according to claim 2 is memorized by the storage means at the time of said recording start according to claim 1 with which it all comes out and is characterized by a certain thing.

[0008] Since all the images that should be recorded are memorized [ according to this invention ] in addition to the above-mentioned effectiveness, when repeating and recording the memorized image, it is not based on a data transfer rate from host equipment, but high-speed record is possible.

[0009] It is the ink jet recording device according to claim 1 characterized by the image data corresponding to two or more trains image with which invention according to claim 3 is memorized by the storage means at the time of said recording start being a part of image data corresponding to the image of each train.

[0010] According to this invention, since there is little data required at the time of image recording initiation compared with all image data, the time amount to a recording start can be shortened and it becomes still more nearly accelerable [ processing speed ].

[0011] It is the ink jet recording device according to claim 1 characterized by the image data corresponding to two or more trains image with which invention according to claim 4 is memorized by said storage means being image data required for the at least 1 scan corresponding to the image of each train.

[0012] According to this invention, in case the data which should be recorded on each conveyance on the street are divided and transmitted in the format near record units, such as a scan unit, and the Rhine unit, a pixel unit, improvement in the speed of processing speed is possible.

[0013] The image data corresponding to the image of the train transmitted to the last among the image data corresponding to two or more trains image with which invention according to claim 5 is memorized by the storage means at the time of said recording start is an ink jet recording device according to claim 1 characterized by being this a part of image data.

[0014] Since according to this invention record is started after a part of image data corresponding to the image of the train which is transmitted at the end in any case is memorized in case data transfer is carried out in the order of an image, when data are transmitted in the format near record units, such as a scan unit, and the Rhine unit, a pixel unit, or, improvement in the speed of processing speed is possible.

[0015] The image data corresponding to the image of the train transmitted to the last among the image data corresponding to two or more trains image with which invention according to claim 6 is memorized by the storage means at the time of said recording start is an ink jet recording device according to claim 1 characterized by being image data required for at least 1 scan.

[0016] according to this invention -- the order of an image -- and in case data transfer is carried out in a near format per record, improvement in the speed of processing speed can do the inside of an image.

[0017] The image of the train transmitted before the image of a train with which invention according to claim 7 is transmitted at the end is an ink jet recording device according to claim 5 or 6 characterized by memorizing all corresponding image data.

[0018] According to this invention, in case data transfer is carried out to the order of an image, improvement in the speed of processing speed can be performed.

[0019] The conveyance way of two or more trains for invention according to claim 8 being an ink jet recording device which injects ink and records an image on a record medium, and conveying the record medium of two or more trains respectively, A conveyance means for it to be prepared corresponding to the conveyance on the street of said two or more trains, and to convey the record medium of two or more trains, The record means which records by scanning covering the conveyance direction and the abbreviation rectangular cross direction of a record medium of said two or more trains to the record medium of said two or more trains, and injecting ink, In the condition of having a storage means to memorize the image data for two or more trains image, the train the image data corresponding to some or all of an image was remembered to be by said storage means, and the train image data is not substantially remembered to be It is the ink jet recording device which has the record control means which starts record by said record means.

[0020] In this invention, if image data is not memorized substantially, it will say that image data required for one scan is not memorized.

[0021] According to this invention, in case data transfer is carried out to the order of an image, further improvement in the speed of processing speed can be performed.

[0022] It is the ink jet recording device according to claim 8 characterized by the image data of the train invention according to claim 9 was remembered to be by the storage means being image data corresponding to all of images.

[0023] According to this invention, in addition to the effectiveness of claim 8, record control can be made simple.

[0024] It is the ink jet recording device according to claim 8 with which the image data corresponding to all of images in the image data of the train invention according to claim 10 was remembered to be by the storage means, and image data required for at least 1 scan are characterized by what is memorized respectively.

[0025] According to this invention, further improvement in the speed of processing speed can be performed.

[0026] The image data of the train invention according to claim 11 was remembered to be by the storage means is an ink jet recording device according to claim 8 characterized by being image data required for at least 1 scan.

[0027] Since according to this invention record is started after a part of image data corresponding to the image of the train which is transmitted at the end in any case is memorized when data are transmitted in a format with the image near record units, such as a scan unit, and the Rhine unit, a pixel unit, in addition to the effectiveness of claim 8 or, further improvement in the speed of processing speed can be performed.

[0028] Invention according to claim 12 injects ink based on the image data which received from the image processing system. The conveyance way of two or more trains for being the ink jet recording device which records an image on a record medium, and conveying the record medium of two or more trains respectively, A conveyance means for it to be prepared corresponding to the conveyance on the street of said two or more trains, and to convey the record medium of two or more trains, The record means which records by scanning covering the conveyance direction and the abbreviation rectangular cross direction of a record medium of said two or more trains to the record medium of said two or more trains, and injecting ink, It has a storage means to memorize the image data transmitted from said image processing system. From said image processing system, the image data corresponding to one image is divided into plurality. The sequential transfer even of the divided image data corresponding to the Nth (N is two or more integers) image is carried out following the divided image data corresponding to the 1st image. After memorizing the image data corresponding to said Nth image for said storage means, it is the ink jet recording device characterized by starting record by said record means.

[0029] According to this invention, capacity of the memory used for a storage means can be lessened, and there is effectiveness which can also perform improvement in the speed of processing speed.

[0030] Invention according to claim 13 is an ink jet recording device according to claim 12 characterized by the division unit of said image data being M (M being one or more integers) Rhine unit.

[0031] According to this invention, when the nozzle consistency of a recording head is mainly lower than recording density, the processing load by the side of an image processing system can be reduced by transmitting data and rearranging them per record by the recording device side based on the memorized data per M lines.

[0032] Invention according to claim 14 injects ink based on the image data which received from the image processing system. The conveyance way of two or more trains for being the ink jet recording device which records an image on a record medium, and conveying the record medium of two or more trains respectively, A conveyance means for it to be prepared corresponding to the conveyance on the street of said two or more trains, and to convey the record medium of two or more trains, The record means which records by scanning covering the conveyance direction and the abbreviation rectangular cross direction of a record medium of said two or more trains to the record medium of said two or more trains, and injecting ink, A receiving means to receive the image data transmitted from said image recording equipment, \*\*\*\* and the image data corresponding to one image is divided into plurality from

said image processing system. It is the ink jet recording device which the sequential transfer even of the divided image data corresponding to the Nth (N is two or more integers) image is carried out following the divided image data corresponding to the 1st image, and is characterized by performing record by said record means according to reception with said receiving means.

[0033] Since a storage means is not needed in order to record according to the received data from an image processing system according to this invention, while it is possible to shorten the time amount to image recording initiation, a recording device side can be simplified and it contributes to low cost-ization.

[0034] Invention according to claim 15 is an ink jet recording device according to claim 12 or 14 characterized by being the unit which needs the division unit of said image data for record of each scan.

[0035] According to this invention, further improvement in the speed of processing speed can be performed.

[0036] Invention according to claim 16 is an image processing system which transmits the image data for recording an image on the record medium of an ink jet recording apparatus, and the image data corresponding to one image is the image processing system characterized by dividing into plurality and carrying out the sequential transfer even of the divided image data corresponding to the Nth (N being two or more integers) image following the divided image data corresponding to the 1st image.

[0037] According to this invention, capacity of a storage means is made to a miniaturization or zero, and improvement in the speed of processing speed can be performed.

[0038] Invention according to claim 17 is an image processing system according to claim 16 characterized by the division unit of said image data being M (M being one or more integers) Rhine unit.

[0039] According to this invention, when the nozzle consistency of a recording head is mainly lower than recording density, the processing load by the side of an image processing system can be reduced by transmitting data and rearranging them per record by the recording device side based on the memorized data per M lines.

[0040] Invention according to claim 18 is an image processing system according to claim 16 characterized by being the unit which needs the division unit of said image data for record of each scan.

[0041] According to this invention, further improvement in the speed of processing speed can be performed.

[0042]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained.

[0043] First, an example of the whole configuration of the ink jet recording device concerning this invention is explained.

[0044] Drawing 1 is the perspective view showing the outline of the ink jet recording device which adopted 2 train recording method, and a record medium, the conveyance way where 1A and 1B convey 10A, and 10B conveys respectively these record media 1A and 1B, a conveyance means by which 2 conveys these record media 1A and 1B, a record means by which 3 records on a record medium, and 4 are cutters which cut these record media 1A and 1B.

[0045] Record media 1A and 1B are held pivotable in the equipment upper part, respectively as the 1st paper roll 100A which was wound in the shape of a long picture, respectively, and was formed in the shape of a roll, and the 2nd paper roll 100B. Thereby, record media 1A and 1B are supplied from each paper rolls 100A and 100B, respectively, and are conveyed with a conveyance means 2 to mention later by down [ on a drawing ].

[0046] In addition, in this invention, although this specification illustrates and explains the case where record media 1A and 1B are supplied, respectively, from two paper rolls 100A and 100B in this way, if it is constituted so that the record medium with which an image is recorded may serve as two or more-train two or more trains, the number of the paper rolls which supply this record medium will not be limited to two to illustrate.

[0047] The conveyance means 2 is formed in the conveyance ways 10A and 10B of record media 1A and 1B. The sticking-by-pressure rollers 22A and 22B for making each record media 1A and 1B stick respectively independently by pressure to the conveyance rollers 21A and 21B and these conveyance rollers 21A and 21B corresponding to each record media 1A and 1B, respectively, It is constituted by the conveyance motors 23A and 23B for making the above-mentioned conveyance rollers 21A and 21B drive. They are respectively conveyed by rotation of the conveyance roller 21 by down [ on a drawing ], the record media 1A and 1B supplied from each paper rolls 100A and 100B, respectively being pinched between the above-mentioned conveyance rollers 21A and 21B and the sticking-by-pressure rollers 22A and 22B.

[0048] Thus, the conveyance ways 10A and 10B of plurality (two) are formed by supplying each record media 1A and 1B.

[0049] Conveyance and a halt are controllable by the above-mentioned configuration for every conveyance way by sticking by pressure and opening respectively the sticking-by-pressure rollers 22A and 22B formed in each conveyance ways 10A and 10B.

[0050] The record means 3 is arranged at the downstream of the above-mentioned conveyance means 2. Each record-medium 1A, The recording head 31 for injecting liquid drop-like ink from two or more nozzles to these record media 1A and 1B, and carrying out record formation of the image at the front-face side (recording surface side) of 1B, It is constituted by the carriage motor 34 to which the carriage 33 attached movable along with the scan guide 32 constructed across horizontally so that an abbreviation rectangular cross might be carried out with the conveyance direction (the direction of vertical scanning) of record media 1A and 1B, and this carriage 33 are moved.

[0051] A recording head 31 For example, two or more ink tanks by which each ink, such as Y (yellow), M (Magenta), C (cyanogen), and K (black), was stored, By having many nozzle heads for injecting the ink in each ink tank liquid drop-like, being constituted, and equipping carriage 33 with these By driving by the carriage motor 34, this carriage 33 continues and moves to each record media 1A and 1B along the conveyance direction of record media 1A and 1B, and the direction (main scanning direction) which carries out an abbreviation rectangular cross. The movement magnitude of this recording head 31 is detected by the encoder which is not illustrated.

[0052] Drawing 2 is a block diagram for explaining an example of the electric configuration of the ink jet recording apparatus of this invention.

[0053] In drawing 2, 41 is CPU which performs various data processing, 42 is RAM, 43 is ROM, and 44 is I/F (interface) which makes connection possible with host equipments, such as a computer.

[0054] CPU41 is connected with host equipments, such as a computer, through I/F44. This CPU41 controls record actuation based on the program and data which were stored in the program memory of the signal read into RAM42 from host equipment, and ROM43 gestalt etc.

[0055] Moreover, I/O45 which is an input/output terminal has connected with the various sensor 49 grades for detecting the location of the control panel 48 for an operator to perform the encoder 46 which detects the movement magnitude of carriage, the carriage motor 34 which drives carriage, the vertical-format-unit section 47 which controls a conveyance means, and various actuation, and a record medium etc. in drawing 2.

[0056] Incorporation of the encoder signal from an encoder 46, control of the carriage motor 34, control of the vertical-format-unit section 47, the communication link with a control panel 48, and incorporation of the input value from the various sensors 49 are performed by CPU41 through I/O45.

[0057] Furthermore, for 50, as for an image memory and 52, an image transfer controller and 51 are [ a head driver and 31 ] recording heads in drawing 2.

[0058] The image transfer controller 50 is controlled by CPU41, it memorizes the image data transmitted by the host to an image memory 51, or reads the image data memorized in this image memory 51 at the time of record, and controls a recording head 31 through the head driver 52.

[0059] An image memory 51 is a storage means to memorize temporarily the image data transmitted by the host.

[0060] The head driver 52 is for carrying out drive control of the recording head 31.

[0061] The image data from a host is memorized to an image memory 51 through I/F44 by the image transfer controller 50 controlled by CPU41 through CPU41. CPU41 reads the image data memorized in the image memory 51, or the image transfer controller 50 reads it by setup of CPU41, and it controls a recording head 31 through the head driver 52.

[0062] The 1st example of record control of the ink jet recording device which has the configuration shown in drawing 2 is explained.

[0063] The configuration of the image memory 51 used for introduction and this control is briefly explained using drawing 3.

Drawing 3 is the conceptual diagram of the memory configuration in the case of recording two trains by four colors of K, C, M, and Y.

[0064] A lengthwise direction has more than the maximum record height more than the maximum recording width of the image with which those of K, C, M, and Y with the 4th page and a longitudinal direction should record memory corresponding to each train. The image data from host equipment is memorized by each train memory in the image of an image through I/F44. Henceforth, in drawing 4 which shows the condition of an image memory 51, drawing 6, drawing 7 (a), drawing 8 (a), and drawing 9 (a), a slash shows the part image data was remembered to be.

[0065] The case where 2 train records are performed for an image with a width of face [ of n pixels ] and a height of m pixels by four colors of K, C, M, and Y is mentioned as an example, and the mode of this operation explains it. In addition, head conditions are the heads carried out in the direction of vertical scanning four nozzle configurations by nozzle spacing 720dpi, and are explained as what records 720dpi.

[0066] By this invention, the condition of the image memory at the time of a recording start is important, and an example of the condition is shown in drawing 4. In drawing 4, the shadow area shows the part image data is remembered to be. The image data corresponding to each image in the data corresponding to two or more images memorized in the image memory 51 which is a storage means all comes out of this mode, and a certain thing is shown.

[0067] (Reception of image data) In advance of record by the recording head 31, an image data transfer is performed for every image from host equipment. The transmitted image data is memorized through I/F44 in an image memory 51. After the data for one image of a train 1 finish transmitting this image transfer, it transmits the data for one image of a train 2. At this time, a transfer of an image may be performed [ image / of a train 2 ] from the image of a train 1. Moreover, the method of the data transfer from the host within 1 image may send each color for every field, may send each color for every scanning line, and may send each color for every point. Thus, as shown in drawing 4, when all the images are transmitted, record by the recording head 31 is started.

[0068] (Read-out and record of image data) The record by the recording head 31 is read from an image memory 51 by CPU41 and the image transfer controller 50, and is performed based on the image data sent to the head driver 52. That is, it depends for the sequence of record by the recording head 31 on the sequence which reads image data from an image memory 51.

[0069] In this case Data [ of the 1st scan eye of (K1, C1, M1, Y1) ] -> Data [ of the 1st scan eye of (K2, C2, M2, Y2) ] -> Data [ of the 2nd scan eye of data -> (K2, C2, M2, Y2) of the 2nd scan eye of (K1, C1, M1, Y1) ] -> -- (K1, C1, M1, Y1) Image data is read like the data of the i-th scan eye of data -> (K2, C2, M2, Y2) of the i-th scan eye. Image data is read from an image memory 51 by CPU41 and the image transfer controller 50 in such sequence, it is sent to the head driver 52, and record by the recording head 31 is performed. Record is completed by repeating a scan until m pixel record ends this. In addition, when the height of the image data of each train differs, it scans until it finishes recording all images. In addition, it is controlling in the condition of not recording, during the scan about a train without the image data which should be recorded.

[0070] If the height of an image memory 51 is larger than the record die length (= the number of nozzle spacing x nozzles) of a recording head 31 at this time, since it can overwrite about the part which the writing scan completed one by one, it is starting the image [ degree ] data transfer of an applicable train, and a print rate can be improved.

[0071] Moreover, the order of read-out in each scan is explained using drawing 5.

[0072] In drawing 5, the figure shows the data read-out sequence about one color. Although there shall not be the Lord of a head and a location gap of the direction of vertical scanning at drawing 5 for simplification of explanation, in order to double the record location of each color in fact, the memory write location at the time of data storage is shifted, or the readout location of data required for scan each each i-th color outgoing radiation is shifted. Moreover, in this example, although the consistency and recording density of a nozzle are the same, in not being the same, being conscious of nozzle spacing, it reads data required for 1 outgoing radiation.

[0073] Data required for the one 1st scan outgoing radiation of data -> M1 required for the one 1st scan outgoing radiation of data -



>C1 required for the one 1st scan outgoing radiation of K1 in one column of drawing 5 -> It is shown that read-out of data required for the one 1st scan outgoing radiation of Y1 is performed. .. In the n column, read-out of data required for the one n-th scan outgoing radiation of data ->Y required for the one n-th scan outgoing radiation of data ->M required for the one n-th scan outgoing radiation of data ->C required for the one n-th scan outgoing radiation of K is performed, and the data of eye one scan of K2 are read similarly henceforth. In addition, in the non-recording period between scans, the outgoing radiation to data read-out and a head is stopped. Thus, read-out of the image data at the time of each scan is performed.

[0074] Next, the 2nd example of record control of the ink jet recording device which has the configuration shown in drawing 2 is explained using drawing 6.

[0075] In the mode of this operation, an image memory 51 uses what is shown in drawing 3, mentions as an example the case where 2 train records are performed for an image with a width of face [ of n pixels ], and a height of m pixels by four colors of K, C, M, and Y, and explains it. In addition, head conditions are the heads carried out in the direction of vertical scanning four nozzle configurations by nozzle spacing 720dpi, and are explained as what records 720dpi.

[0076] Drawing 6 shows the condition of the image memory 51 at the time of the recording start in the mode of this operation. The shadow area shows the part image data is remembered to be, and the image data corresponding to the last image shows that only a part for one scan is memorized among the image data corresponding to two or more images memorized in the image memory 51 whose drawing 6 is a storage means.

[0077] (Reception of image data) In advance of record by the recording head 31, an image data transfer is performed for every image from host equipment. The transmitted image data is memorized through I/F44 in an image memory 51. After the data for one image of a train 1 finish transmitting this image transfer, it transmits the data for one image of a train 2. At this time, a transfer of an image may be performed [ image / of a train 2 ] from the image of a train 1. Moreover, in the mode of this operation, unlike the 1st mode, the image data corresponding to one image is divided into plurality, and the method of the image data transfer from the host equipment within 1 image sends the image data of each color for every unit required for record of each scan like the approach of sending each color for every method of sending each color for every scanning-line unit, or pixel unit. Thus, when the image data of the 1st scan eye is transmitted about the transfer image of the last transmitted as shown in drawing 6, record by the recording head 31 is started.

[0078] (Read-out and record of image data) The record by the recording head 31 is read from an image memory 51 by CPU41 and the image transfer controller 50, and is performed based on the image data sent to the head driver 52. That is, record by the recording head 31 is performed based on the order which reads image data from an image memory 51.

[0079] In the mode of this operation, it is nozzle spacing. 720dpi and a nozzle consider the case where 720dpi is recorded in the direction of vertical scanning in two trains by the head with which a total of four nozzles of four colors of K, C, M, and Y were arranged. In this case, 1 scan data read-out of 1 scan data read-out -> (K2, C2, M2, Y2) of (K1, C1, M1, Y1) is performed. Henceforth, as soon as an image is memorized by train 2 memory and data required for the scan after degree scan are equal to memory -> (K1, C1, M1, Y1) 2 scan data read-out -> 2 scan data read-out of (K2, C2, M2, Y2) .. Image data is read from the image memory in order of i scan data read-out of -> (K1, C1, M1, Y1) i scan data read-out -> (K2, C2, M2, Y2), and it is sent to the head driver 52. Record is completed by repeating a scan until m pixel record is completed.

[0080] In addition, when the height of the image data of each train differs, it scans until it finishes recording all images. During the scan about a train without the image data which should be recorded, the outgoing radiation to data read-out and a head is stopped, and vertical scanning of the train is suspended.

[0081] Moreover, if the height of an image memory is larger than the record die length (the number of = nozzle spacing x nozzles) of a head, since it can overwrite about the part which the writing scan completed one by one, a print rate can be improved by starting the image [ degree ] data transfer of an applicable train.

[0082] Moreover, read-out by each scan is the same as that of the record control shown in drawing 5.

[0083] although image recording is started in the ink-jet recording apparatus by the 1st example of record control after all the image data transfers for the number of record trains are completed -- the voice of this operation -- when data transfer required for record of 1. horizontal scanning of the image data for a train only with few one train than a record train and the last image is completed to an image memory 51, in the ink-jet recording apparatus which twists like, the time amount from an image input to record can shorten by starting record.

[0084] Next, the 3rd example of record control of the ink jet recording device which has the configuration shown in drawing 2 is explained based on drawing 7, drawing 8 R> 8, and drawing 9.

[0085] In the mode of this operation, an image memory 51 uses what is shown in drawing 3, mentions as an example the case where 2 train records are performed for an image with a width of face [ of n pixels ], and a height of m pixels by four colors of K, C, M, and Y, and explains it. In addition, head conditions are the heads carried out in the direction of vertical scanning four nozzle configurations by nozzle spacing 720dpi, and are explained as what records 720dpi.

[0086] Drawing 7 (a) and (b) show the condition of the image memory 51 at the time of the recording start in the mode of this operation, and the record condition by the recording head 31 at that time, respectively.

[0087] drawing 8 (a) and (b) -- respectively -- the voice of this operation -- the condition of the image memory 51 at the time of a certain record which can be set like, and the record condition by the recording head 31 at that time are shown.

[0088] drawing 9 (a) and (b) -- respectively -- the voice of this operation -- the condition of the image memory 51 at the time of other records which can be set like, and the record condition by the recording head 31 at that time are shown.

[0089] In drawing 7 (a), drawing 8 (a), and drawing 9 (a), the shadow area shows the part image data is remembered to be, and drawing 7 (a) shows that only a part for 1 corresponding to the image of eye one train in the image data corresponding to two or more images memorized in the image memory 51 which is a storage means scan is memorized. As for all eyes one train, image data with a width of face [ of n pixels ] and a height of m pixels is filled by the image memory 51 whose drawing 8 (a) is a storage means, and eye two trains shows the condition that a part for one scan was filled. The image data corresponding to each image in the image data

corresponding to two or more images memorized in the image memory 51 which is a storage means all comes out of drawing 9 (a), and a certain thing is shown.

[0090] (Reception of image data) In advance of record by the recording head 31, an image data transfer is performed for every image from host equipment. The transmitted image data is memorized through I/F44 in an image memory 51. After the data for one image of a train 1 finish transmitting this image transfer, it transmits the data for one image of a train 2. At this time, a transfer of an image may be performed [ image / of a train 2 ] from the image of a train 1. Moreover, the method of the image data transfer from the host equipment within 1 image sends the image data of each color for every unit required for a scan like the approach of sending each color for every method of sending each color for every scanning-line unit, or pixel unit. In this way, like drawing 7 R> 7 (a), the record by the recording head (read-out and record of image data) 31 to which image data will start record actuation if a transfer is completed above by 1 horizontal scanning for one train is read from an image memory 51 by CPU41 and the image transfer controller 50, and is performed based on the image data sent to the head driver 52. That is, record by the recording head 31 is performed based on the order which reads image data from an image memory 51.

[0091] In this case, 1 scan data read-out of (K1, C1, M1, Y1) is performed, as soon as image data henceforth required for the scan after degree scan of the train currently recorded gathers, image data is read from an image memory 51, it is sent to the head driver 52, and a writing scan is repeated. In addition, vertical scanning of the train which is not recorded is not performed. In this way, the intermediate record condition when repeating the scan of only a train 1 is combined with drawing 7 (b), and is shown.

[0092] Moreover, as for all eyes one train, image data with a width of face [ of n pixels ] and a height of m pixels is filled, and drawing 8 (a) means the condition that, as for eye two trains, a part for one scan was filled. Since record will not be completed even if an image transfer of eye one train is completed if it is a transfer rate > recording rate, while a recording head records the image of eye one train, as shown in drawing 8 (a), the data which can also record the image of eye two trains are equal to an image memory. For this reason, as soon as an image memory 23 has complete set of image data possible to the scan of eye two trains during record in a recording head 23, it records on 2 train coincidence. Henceforth, an image is recorded as soon as data required for the image recording of eye two trains are assembled. The record condition which is carrying out concurrency record of a train 1 and the train 2 is shown in drawing 8 R> 8 (b).

[0093] Then, when there is no image which should newly be recorded on eye one train, as shown in drawing 9 (a), image data will be filled by all the image memories 51, and, finally image recording will record only the image of eye two trains. In addition, the record condition which is recording only the train 2 is shown in drawing 9 (b). Under the present circumstances, the train 1 which record completed suspends vertical scanning.

[0094] In addition, although two trains explained here using the case of juxtaposition record of two images If the height of an image memory is larger than the record die length (the number of = nozzle spacing x nozzles) of a recording head 31, since it can overwrite about the part which the writing scan completed one by one, it is starting the image [ degree ] data transfer of an applicable train. \*\* it does not vacate the time to degree image recording within a train, it can shorten and a print rate can be improved.

[0095] Moreover, read-out by each scan is the same as that of the record control shown in drawing 5.

[0096] In the ink jet recording apparatus by the 2nd example of record control, after image data transfer required for record of 1 horizontal scanning of the image of image data only with less 1 than the total number of record trains and the last was completed to the image memory, record was started. However, in the mode of this operation, from the record train to which image data required for record of 1 horizontal scanning was equal, since record is not completed by carrying out a recording start one by one at the time of a transfer rate > recording rate even if the 1st image transfer is completed, the parallel record of the 1st image and the 2nd image can be carried out. By doing in this way, since a horizontal-scanning recording width also decreases in the second half of a record unit while shortening further the time amount to an image input - record, chart lasting time can also be shortened. In addition, although the explanation about the case of a recording rate >= transfer rate is omitted, it becomes record of every a piece train in this case. Even in this case, compaction of chart lasting time is possible.

[0097] Drawing 10 is a timing chart which shows the transfer time of an image and the chart lasting time of an image by the ink jet recording apparatus shown in drawing 2.

[0098] In drawing 10 the data transfer time of the image of eye one train and  $td1$  The data transfer time of the image of eye two trains, The image recording time amount of the image of eye one train and  $tR2$   $tR1$  The image recording time amount of the image of eye two trains, 1 according [  $tR$  ] to the 1st and 2 train, the image recording time amount of two trains, 1 according [  $tR12$  ] to the 3rd example, the image recording time amount of two trains, and  $t1$ ,  $t2$  and  $t3$  show completion time amount, and  $t4$  shows the completion time amount of the image of eye one train, respectively. Moreover, A shows actuation of the ink jet recording apparatus by the 1st example of record control, B shows actuation of the ink jet recording apparatus by the 2nd example of record control, and C shows actuation of the ink jet recording apparatus by the 3rd example of record control.

[0099] Although the recording rate by the recording head 31 and the transfer rate with which image data is transmitted to an image memory may have quick whichever in this invention, the case where a transfer rate is quicker than a recording rate here is mentioned as an example, and is explained. Moreover, although there will be especially no limit also about a record train if it is the plurality of two or more trains in this invention, the case where it records in two trains here is mentioned as an example, and is explained.

[0100] In the ink jet recording device of the mode of A, when finishing transmitting all the images of eye one train and eye two trains, record actuation of all trains is started. In the ink jet recording device of the mode of B When the image data of the one section of eye two trains is transmitted, record actuation of all trains is started. In the ink jet recording device of the mode of C When the image data of the one section of eye one train is transmitted, record actuation of eye one train begins, and when the image data of the one section of eye two trains is transmitted about record actuation of eye two trains, it starts.

[0101] Although the ink jet equipment by the 1st example of record control can be aiming at improvement in a throughput rather than conventional ink jet equipment in that record actuation can be performed to two or more trains coincidence Thus, since the recording start time is earlier than the ink jet equipment by the 1st example of record control, the ink jet equipment by the 2nd example of record

control can aim at improvement in a throughput more. Rather than the ink jet equipment by the 2nd example of record control, since the recording start time is still earlier, the ink jet equipment by the 3rd example of record control can aim at improvement in a throughput further.

[0102] Drawing 11 is a block diagram for explaining other examples of the electric configuration of the ink jet recording apparatus of this invention. The same sign as drawing 2 shows the same configuration, and detailed explanation is omitted.

[0103] Although the image data of N (N is two or more integers) individual is recordable in N train with this invention, the mode of this operation explains as  $N=2$ .

[0104] The case where 2 train records are performed for an image with a width of face [ of n pixels ] and a height of m pixels by four colors of K, C, M, and Y is mentioned as an example, and the mode of this operation explains it. In addition, head conditions are the heads carried out in the direction of vertical scanning four nozzle configurations by nozzle spacing 720dpi, and are explained as what records 720dpi.

[0105] In the ink jet recording apparatus by the configuration of drawing 2, the image data transfer was transmitted from host equipment for every image. That is, although the method which transmits the data for one image of a train 2 was taken after the data for one image of a train 1 finished transmitting, the operation gestalt of drawing 11 performs the image data transfer from an image processing system in the sequence corresponding to the record sequence by the recording head 31. By doing in this way, it becomes recordable at those without image memory specially. The host equipment which can divide and send an image as an image processing system at this time is used.

[0106] The image processing system which can transmit this division image is contained in the ink jet recording device of this invention in the range of this invention, when an image transfer is carried out.

[0107] The record control in the ink jet recording device which has the configuration shown in drawing 11 is explained.

[0108] (Reception and record of image data) First, host equipment is a unit required for record of each scan and each scan in the sequence corresponding to the record sequence by the recording head, and transmits image data. Since it does not have an image memory with the gestalt of this operation, in consideration of the amount of record location amendments between the colors accompanying a stowed position gap of the head of the Lord and the direction of vertical scanning, host equipment transmits image data in order of the outgoing radiation of a recording head 31.

[0109] Next, when each scan, each color, and data required for the outgoing radiation of each nozzle are assembled, record by the recording head 31 is performed at any time. Although it combined at the non-recording period between scans and the outgoing radiation to a head is stopped, also at this rate, it takes into consideration beforehand by the host equipment side, and an image data transfer is performed. The image data of a non-recording period can be used as white data or non-regurgitation data. The above data reception and injection are repeated till the completion of 1 scan. Record is completed by repeating until all pixel records end this scan. In addition, when the height of the image data of each train differs, it scans until all images finish recording. During the scan about a train without the image data which should be recorded, it controlled in the condition of not recording or the host has added white data.

[0110] Since it is not necessary to prepare image memory specially according to the gestalt of this operation, simplification of equipment can be attained compared with the configuration of drawing 2.

[0111] Drawing 12 is a block diagram for explaining other examples of the electric configuration of the ink jet recording apparatus of this invention. Since the same sign as drawing 2 is the same configuration, detailed explanation is omitted.

[0112] The gestalt of this operation performs the image data transfer from host equipment as well as the configuration of drawing 11 in the sequence corresponding to the record sequence by the recording head 31. By doing in this way, an image memory 51 becomes possible [ considering as a small capacity compared with the configuration explained by drawing 2 ].

[0113] Drawing 13 is the conceptual diagram of the configuration of the image memory 51 in the configuration shown in drawing 12.

[0114] Although two trains explain here, in two or more-train two or more trains, it can constitute from increasing lateral width of face similarly. Moreover, in the case of color [ YMCK4 ], it explains, but constraint of the color number is not received.

[0115] A lengthwise direction has more than the record die length (the number of = nozzle spacing x nozzles) of a recording head 31 more than the maximum recording width of the image with which those of K, C, M, and Y with the 4th page and a longitudinal direction should record memory corresponding to each train. The image data from I/F44 is memorized in an image memory 51 corresponding to the record sequence by the recording head 31.

[0116] Moreover, compared with the height of an image, although the control-section configuration of equipment is the same as the configuration of drawing 2 almost, since the record die length of a head is smaller, memory size is small and usually ends (it becomes the scan memory instead of a frame).

[0117] Moreover, it is desirable that record location amendment between the colors accompanying a stowed position gap of the recording head 31 of the direction of vertical scanning can be performed by the recording apparatus side, and it is desirable for amendment at this rate to establish all possible memory size allowances (the height direction), respectively at the time of data read-out.

[0118] Next, the record control approach of an ink jet recording device of having the configuration shown in drawing 12 is explained.

[0119] In the mode of this operation, it is nozzle spacing about 2 train records at four colors of K, C, M, and Y in an image with a width of face [ of n pixels ], and a height of m pixels. 720dpi and a nozzle mention as an example the case where it carries out by record of 720dpi, and the head to which a total of four nozzle configuration of vertical-scanning \*\*\*\*\* was carried out explains them.

[0120] First, record by the method and recording head 32 of a data transfer from host equipment is explained.

[0121] Although the image data of N (N is two or more integers) individual is recordable in N train with this invention, the mode of this operation explains as  $N=2$ .

[0122] In the ink jet recording apparatus by the configuration of drawing 2, the image data transfer was transmitted from host

equipment for every image. That is, although the method which transmits the data for one image of a train 2 was taken after the data for one image of a train 1 finished transmitting, the operation gestalt of drawing 11 performs the image data transfer from an image processing system in the sequence corresponding to the record sequence by the recording head 31. By doing in this way, it becomes recordable by small memory compared with the ink jet recording device by the configuration of drawing 2. The host equipment which can divide and send an image as an image processing system at this time is used. Although the division unit of the image from an image processing system can be divided per M (M is one or more integers) Rhine in this invention at this time, it explains as  $M=i$  here.

[0123] The image processing system which can transmit this division image is contained in the ink jet recording device which has the configuration of this invention in the range of this invention, when an image transfer is carried out.

[0124] The record control in the ink jet recording device which has the configuration shown in drawing 12 is explained.

[0125] (Reception of image data, and read-out and record) In advance of record by the recording head 31, image data is transmitted to an image memory 51 through I/F44 from host equipment. In this way, record is started when only the part which needs for each scan the image data passed through and transmitted from host equipment about the image memory 51 gathers. Record reads image data from an image memory 51 to the record sequential by the recording head 31, and is performed by sending to the head driver 52. It combined at the non-recording period between scans, and the outgoing radiation to image data read-out and a recording head 31 is stopped.

[0126] Henceforth, record is completed by the image data reception from a host, and repeating read-out actuation, and repeating a scan until m pixel record is completed. In addition, when the height of the image data of each train differs, it scans until all images finish recording. It is controlling in the condition of not recording, during the scan about a train without the image data which should be recorded.

[0127] Below, image data transfer sequence and record sequence are shown. In this case 1 scan  $\rightarrow$  of (K1, C1, M1, Y1) eye 2 [ of 1 scan  $\rightarrow$  (K1, C1, M1, Y1) of (K2, C2, M2, Y2) ] of 2 scan  $\rightarrow$  (K2, C2, M2, Y2) scans .. eye i scan of i scan  $\rightarrow$  (K2, C2, M2, Y2) of  $\rightarrow$  (K1, C1, M1, Y1) -- moreover The order of a transfer within each scan transmits data like four data required for four required for four required for four required for 1st i scan outgoing radiation of K1 data  $\rightarrow$  1st i scan outgoing radiation of C1 data  $\rightarrow$  1st i scan outgoing radiation of M1 data  $\rightarrow$  1st i scan outgoing radiation of Y1. Thus, in harmony with read-out of image data, an image transfer is repeated, image data is read, and record by the recording head is performed until a m-pixel height transfer is completed.

[0128] (Size of an image memory, and relation of data reception and read-out) the voice of this operation -- it sets like, and although complement \*\*\*\*\* of the size of an image memory 51 is good for at least 1 scan, only in the case of a complement, the size of an image memory can carry out image data reception from said host, and image data read-out record to 1 horizontal scanning by turns. Moreover, the suitable allowances for the size of an image memory 51 can be given, and read-out actuation for an image data storage and record can be performed in parallel by little memory by using the size which can memorize image data, then memory more than a part required for 2 horizontal-scanning records as each color ring memory etc. Furthermore, if it is an image recording rate < data transfer rate, a data transfer time can be made to hide in chart lasting time, continuation scan record will be attained, and a recording rate will improve.

[0129] (Size of an image memory) Image recording is started, after supposing that storage of the image data of a part required for 1 horizontal-scanning record at least is possible for an image memory 51 and completing an image transfer required for record of at least 1 horizontal scanning with the gestalt of this operation as compared with the ink jet recording device which has the configuration shown in drawing 11 about the size of an image memory, and the relation of data reception and read-out again for stabilization (it is kept constant) of the scan speed in the record period of a recording head 31. Thus, by having the memory of image data required for 1 scan record at least, the transfer sequence from the host of image data is also effective in constraint of the image transfer sequence from host equipment decreasing within 1 horizontal scanning compared with the ink jet recording device which has the configuration which it becomes unnecessary to be the sequence given to a recording head 31, and is shown in drawing 11.

[0130] Next, when making a record means start record in the ink jet equipment of this invention, the image data corresponding to two or more trains image memorized by the storage means is explained using drawing 14 and drawing 15. In addition, drawing 14 and drawing 15 shall show the storage situation about the image which should be recorded, the slash section shall show the part memorized by the record means, and a transfer sequence shall be transmitted sequentially from the left.

[0131] Drawing 14 (a) shows one mode of claim 1, claim 2, and claim 4. Drawing 14 (b) shows one mode of claim 1, claim 4, claim 5, claim 6, and claim 7. Drawing 14 (c) shows one mode of claim 1, claim 3, claim 4, and claim 5. Drawing 14 (d) shows one mode of claim 1, claim 3, claim 4, and claim 5.

[0132] Drawing 15 (a) shows one mode of claim 8 and claim 10. Drawing 15 (b) shows one mode of claim 8 and claim 11. Drawing 15 (c) shows one mode of claim 8 and claim 11. Drawing 15 (d) shows one mode of claim 8 and claim 9. Drawing 15 (e) shows one mode of claim 8 and claim 9.